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		Application Number	10/044,141
		Filing Date	01/11/2002
		First Named Inventor	Jong Sik Paek
		Art Unit	2815
		Examiner Name	Chu, Chris C.
Total Number of Pages in This Submission		Attorney Docket Number	AMKOR-018A

## ENCLOSURES (Check all that apply)

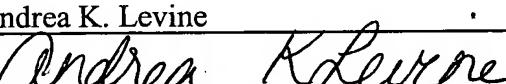
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## SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	STETINA, BRUNA, GARRED & BRUCKER - Customer No. 007663
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Date	1/24/05

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ATTORNEY DOCKET NO: AMKOR-018A  
TITLE: SEMICONDUCTOR PACKAGE WITH STACKED DIES

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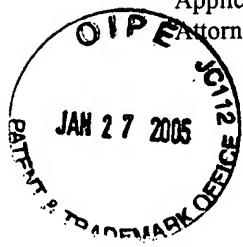
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicants:	Jong Sik Paek	) Confirmation No.	1112
		)	
Serial No.:	10/044/141	) Art Unit:	2815
		)	
Filed:	01/11/2002	) Examiner:	Chu, Chris C.,
		)	
For:	SEMICONDUCTOR PACKAGE WITH STACKED DIES	)	
		)	

**AMENDED APPEAL BRIEF UNDER 37 C.F.R. § 41.37(d)**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir/Madam:

In response to the Notification of Non-Compliant Appeal Brief mailed January 11, 2005 from the U.S.P.T.O., Applicant [hereinafter "Appellant"], in the above-captioned patent application, is submitting an Amended Appeal Brief under 37 C.F.R. § 41.39(d) with the understanding that the proper fees, which have already been paid with respect to the Notice of Appeal filed on September 27, 2004 and Appeal Brief filed on November 1, 2004, are not required. An ORAL HEARING IS NOT REQUESTED.

If for any reason the necessary fee is not associated with this file, the Commissioner is authorized to charge the appropriate fee for the Appeal Brief and/or any necessary extension of time fees to Deposit Account Number 19-4330.

**I. REAL PARTY IN INTEREST**

The real party in interest is Amkor Technology, Inc. by assignment recorded in the U.S. Patent and Trademark Office on January 11, 2002 at Reel 012494, Frame 0594.

**II. RELATED APPEALS AND INTERFERENCES**

No related appeals and/or interferences are pending.

**III. STATUS OF CLAIMS**

Claims 1-21, the only claims pending in the subject application, stand finally rejected (see Appendix entitled "CLAIMS APPENDIX").

**IV. STATUS OF AMENDMENTS**

There are no un-entered amendments.

**V. SUMMARY OF CLAIMED SUBJECT MATTER**

In accordance with an embodiment of the present invention (see Figures 1, 1A-1B, 4A-4E; see Specification pages 4-9 and 11-13, paragraphs [0013]-[0021] and [0025]-[0026]), there is provided a semiconductor package 100 which comprises a plurality of leads 130. Each of the leads 130 defines a first surface 131 which is disposed in opposed relation to a second surface 132, and a third surface 133 which is disposed in opposed relation to the second surface 132 and laterally offset outwardly relative to the first surface 131.

Also included in the semiconductor package 100 are a first semiconductor die 110 and a second semiconductor die 120 which each define opposed top and bottom surfaces. A

plurality of bond pads 113 are disposed on the top surface of the first semiconductor die 110, with bond pads 123 also being disposed on the bottom surface of the second semiconductor die 120. Conductive bumps 150 are used to electrically connect the bond pads 113 of the first semiconductor die 110 to respective ones of the first surfaces 131 of the leads 130, and the bond pads 123 of the second semiconductor die 120 to respective ones of the second surfaces 132 of the leads 130. An encapsulating portion 180 is applied to the leads 130, the first and second semiconductor dies 110, 120 and the conductive bumps 150, with the third surface 133 of each of the leads 130 being exposed within the encapsulating portion 180.

## **VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

(A). Whether independent Claim 1 and dependent Claims 2-6 and 11-21 are improperly rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,337,510 to Chun-Jen et al. [hereinafter “CHUN-JEN”];

(B). Whether dependent Claims 7 and 9 are improperly rejected under 35 U.S.C. § 103(a) as being unpatentable over CHUN-JEN in view of Japanese Reference No. JP-05206219 to Takahashi [hereinafter “TAKAHASHI”]; and

(C). Whether dependent Claims 8 and 10 are improperly rejected under 35 U.S.C. § 103(a) as being unpatentable over CHUN-JEN in view TAKAHASHI, as applied to Claims 7 and 9 above, and in further view of U.S. Patent No. 6,157,074 to Lee [hereinafter “LEE”].

## VII. ARGUMENTS

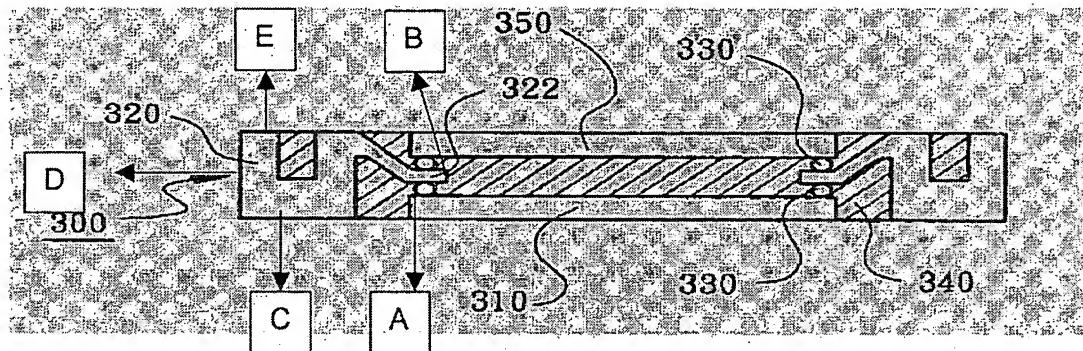
**(A). The rejection of independent Claim 1 and dependent Claims 2-6 and 11-21 under 35 U.S.C. § 102(e) as being anticipated under CHUN-JEN is in error, the rejection should be reversed, and the application should be remanded to the Examiner with instructions to allow Claims 1-6 and 11-21.**

### *A Review of CHUN-JEN*

Figure 5 of CHUN-JEN teaches a stackable QFN semiconductor package 300. In this embodiment, a second die 350 is stacked above the first die 310. The second die 350 is the same size of the first die 310. The first die 310 has bonding pads arranged on the top surface thereof, and near the perimeter edge of the first die 310. The second die 350 has bonding pads arranged on the bottom surface thereof, and near the perimeter edge of the second die 350. A plurality of leads 320 are provided outwards from the first and second dies 310, 350 and partially form the exterior side of the package 300. The leads 320 each have a finger 322 which protrudes inwardly from an inner top portion thereof. Each finger 322 extends downward at about a forty-five degree angle, and further includes a horizontally distal tip which is positioned between the outer edges first and second dies 310, 350. Solder bumps 330 connect the fingers 322 to the bonding pads arranged on the top surface of the first die 310 and the bonding pads arranged on the bottom surface of the second die 350. Further, the first and second dies 310, 350, plurality of leads 320, and solder bumps 330 are encapsulated with molding compound 340 to form the semiconductor package 300.

*The Examiner's Rejection of Independent Claim 1 under CHUN-JEN*

Regarding independent Claim 1, the Examiner submits that CHUN-JEN discloses in Figure 5 a semiconductor package comprising a plurality of leads 320. In the rejection, the Examiner submitted an annotated Figure 5 of CHUN-JEN with labels A through E [hereinafter "EXAMINER'S ILLUSTRATION"] as is shown below:



*EXAMINER'S ILLUSTRATION*

In particular, the Examiner submits that each lead defines:

- a generally planar first surface (See "A" on EXAMINER'S ILLUSTRATION; the generally planar surface area where the solder ball 330 is not attached);
- a generally planar second surface (See "B" on the EXAMINER'S ILLUSTRATION; the generally planar surface area where the solder ball 330 is not attached) disposed in opposed relation to the first surface; and

- a generally planar third surface (See “C” on the EXAMINER’S ILLUSTRATION) disposed in opposed, substantially parallel relation to the second surface and laterally offset outwardly relative to the first surface.

The Examiner further submits that CHUN-JEN teaches a first semiconductor die 310 defining opposed top and bottom surfaces; a second semiconductor die 350 defining opposed top and bottom surfaces; a plurality of conductive connectors 330 electrically and mechanically connecting the first semiconductor die to the first surfaces of the leads and the second semiconductor die to the second surfaces of the leads; and an encapsulating portion 340 applied to and at least partially encapsulating the leads, the first and second semiconductor dies, and the conductive connectors such that at least the first and second surfaces of each of the leads are covered by the encapsulating portion.

In re Independent Claim 1

Appellant’s independent Claim 1, recites, *inter alia*, . . . *a generally planar third surface disposed in opposed, substantially parallel relation to the second surface and laterally offset outwardly relative to the first surface; . . .*

On the other hand, CHUN-JEN does not teach the aforementioned feature. Instead, the CHUN-JEN third surface “C” (as labeled by the Examiner) is laterally offset, *but not opposed* to the CHUN-JEN second surface “B” (as labeled by the Examiner). In more particularity, although the CHUN-JEN first surface “A” (as labeled by the Examiner) is opposed to CHUN-JEN second surface “B”, neither the CHUN-JEN first surface “A” or second surface “B” is in opposed relation to the CHUN-JEN third surface “C”. As a result,

CHUN-JEN does not teach *a generally planar third surface disposed in opposed, substantially parallel relation to the second surface and laterally offset outwardly relative to the first surface*, as is recited in Appellant's independent Claim 1.

It is also noted that the present invention has several notable advantages over CHUN-JEN. First, it is noted that the present invention provides a more compact package than CHUN-JEN. In particular, the downwardly angled fingers 322 taught by CHUN-JEN must clear the perimeter edges of the first and second dies 310, 350. Thus, this feature dictates that the CHUN-JEN leads must be appropriately spaced outwardly from the dies 310, 350 such that interference between the fingers 322 and the perimeter edges of the dies 310, 350 does not occur. In contrast, the configuration of the present invention's leads 130 allows the leads 130 to be positioned more closely to the perimeter edges of the dies 110, 120 without the threat of any interference at all from the fingers of the leads 130.

Another advantage of the present invention is that the shape of the leads 130 is far less complex than the peculiar shape of the CHUN-JEN leads 320, and therefore, the leads 130 present invention can be manufactured more economically than the leads 320 taught by CHUN-JEN. Thus, overall, it is noted that the present invention provides a more compact package, while at the same time being less expensive to manufacture as compared to the CHUN-JEN package.

For the foregoing reasons, and because CHUN-JEN fails to disclose the above-noted features of the present invention, Appellant submits that CHUN-JEN fails to disclose each and every feature of the present invention, as recited in independent Claim 1.

Accordingly, Appellant respectfully requests that the decision by the Examiner to reject Claim 1 under U.S.C. § 102(e) as being anticipated by CHUN-JEN be reversed by the

Board, and that the application be remanded to the Examiner with instructions to withdraw the rejection and to allow the aforementioned claim.

**Dependent Claims 2-6 and 11-21**

Appellant further submits that dependent Claims 2-6 and 11-21 are allowable at least for the reason that these claims depend from allowable independent Claim 1 and because these claims recite additional features that further define the present invention.

Accordingly, Appellant respectfully requests that the decision by the Examiner to reject dependent Claims 2-6 and 11-21 under U.S.C. § 102(e) as being anticipated by CHUN-JEN be reversed by the Board, and that the application be remanded to the Examiner with instructions to withdraw the rejection and to allow the aforementioned claims.

**(B). The rejection of dependent Claims 7 and 9 under 35 U.S.C. § 103(a) as being unpatentable over CHUN-JEN in view of TAKAHASHI is in error, the rejection should be reversed, and the application should be remanded to the Examiner with instructions to allow dependent Claims 7 and 9.**

**A Review of TAKAHASHI**

The purpose of the teachings of TAKAHASHI is to prevent the short circuit of semiconductor element 16 due to unwanted contact with inner leads 10 by covering the plated surfaces of the inner leads 10 of a semiconductor package with an insulative coating film 13. As shown in Figures 1-5, the surface of a plated layer 12 of an inner lead 10 of the film carrier system package is covered by an insulative coating film 13. When the inner lead 10 is bonded to a semiconductor element 16, the insulative coating film 13 is melted only at

the bonding part of the inner lead 10. The inner lead 10 is bonded to a protruding type electrode 17 of a semiconductor element 16. Hence, short circuits are prevented, even when the gap between the inner lead 10 and the semiconductor element 16 is made very narrow, or even when the inner lead 10 comes into contact with the semiconductor element 16. Further, when the inner lead 10 is bent and brought into contact with the adjacent inner lead 10, a short circuit can be prevented by forming the insulative coating film 13.

*The Examiner's Rejection of Dependent Claims 7 and 9 over CHUN-JEN in view of TAKAHASHI*

In regard to dependent Claims 7 and 9, the Examiner contends that CHUN-JEN discloses the claimed invention, except for each of the leads including first and second protective layers on the bump land. The Examiner then submits that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify CHUN-JEN by using first and second protective layers as taught by TAKAHASHI. The Examiner further submits that one of ordinary skill in the art would have been motivated to modify CHUN-JEN in the manner described above for at least the purpose of preventing a short circuit.

*In re Dependent Claim 7*

Appellant's dependent Claim 7 recites, *inter alia*, a first protective layer formed on at least a portion of the first surface thereof other than for the prescribed region including the first bump land; and a second protective layer formed on at least a portion of the second surface thereof other than for the prescribed region including the second bump land.

On the other hand, TAKAHASHI does not teach, *inter alia*, a first protective layer formed on at least a portion of the first surface thereof other than for the prescribed region including the first bump land; and a second protective layer formed on at least a portion of the second surface thereof other than for the prescribed region including the second bump land, as is recited in dependent Claim 7.

Although TAKAHASHI does teach applying an insulative coating film 13 to each of the leads 10, TAKAHASHI does not teach forming a protective layer on a surface of a lead other than for the prescribed region including a bump land. Rather, when the TAKAHASHI protruding type electrode 17 is bonded to the lead 10, only then does the insulative coating film 13 melt. Therefore, TAKAHASHI does not teach initially configuring the film 13 to define a land.

It is also noted that the present invention has another advantage over the TAKAHASHI reference. A downfall of TAKAHASHI is that the insulative coating film 13 must first be melted before bonding can occur. If the insulative coating film 13 does not sufficiently melt, and thus is not successfully displaced by the protruding electrode 17, a good electrical connection is not assured.

On the other hand, as compared to TAKAHASHI, with the present invention, the manner in which the bumps 150 are connected to the first and second lower surfaces 131, 132 of the leads 103 is more reliable. Thus, Applicant submits that the present invention provides a more reliable manner to electrically connect leads to the dies than does TAKAHASHI.

For the foregoing reasons, and because neither CHUN-JEN or TAKAHASHI disclose or suggest, *inter alia*, a first protective layer formed on at least a portion of the first surface thereof other than for the prescribed region including the first bump land; and a second

protective layer formed on at least a portion of the second surface thereof other than for the prescribed region including the second bump land, Applicant submits that no proper combination of these references can render unpatentable the combination of features recited in dependent Claim 7.

Accordingly, Appellant respectfully requests that the decision by the Examiner to reject dependent Claim 7 under U.S.C. § 103(a) as being obvious over CHUN-JEN in view of TAKAHASHI be reversed by the Board, and that the application be remanded to the Examiner with instructions to withdraw the rejection and to allow Claim 7.

*In re Dependent Claim 9*

Appellant's dependent Claim 9 recites, *inter alia*, a first protective layer coated on the first surface thereof about a respective one of the conductive connectors; and a second protective layer coated on the second surface thereof about a respective one of the conductive connectors.

On the other hand, TAKAHASHI does not teach, *inter alia*, a first protective layer coated on the first surface thereof about a respective one of the conductive connectors; and a second protective layer coated on the second surface thereof about a respective one of the conductive connectors, as is recited in dependent Claim 9.

Similar to the distinction discussed above, although TAKAHASHI does teach applying an insulative coating film 13 to each of the leads 10, it is noted that TAKAHASHI teaches melting through the insulative coating film 13. In contrast, dependent Claim 9 teaches a protective layer coated on the surfaces of the leads about the conductive connectors. As has been pointed out, a downfall of TAKAHASHI is that the insulative coating film 13 must first be melted before bonding can occur. If the insulative coating film

13 does not sufficiently melt, and thus is not successfully displaced by the protruding electrode 17, a good electrical connection is not assured.

On the other hand, the present invention has an advantage over the TAKAHASHI reference in that the manner in which the bumps 150 are connected to the first and second lower surfaces 131, 132 of the leads 103 is more reliable. Thus, Applicant submits that the present invention provides a more reliable manner to electrically connect leads to the dies than does TAKAHASHI.

For the foregoing reasons, and because neither CHUN-JEN or TAKAHASHI disclose or suggest, *inter alia*, a first protective layer coated on the first surface thereof about a respective one of the conductive connectors; and a second protective layer coated on the second surface thereof about a respective one of the conductive connectors, Appellant submits that no proper combination of these references can render unpatentable the combination of features recited in dependent Claim 9.

Accordingly, Appellant respectfully requests that the decision by the Examiner to reject dependent Claim 9 under U.S.C. § 103(a) as being obvious over CHUN-JEN in view of TAKAHASHI be reversed by the Board, and that the application be remanded to the Examiner with instructions to withdraw the rejection and to allow Claim 9.

**(C). The rejection of dependent Claims 8 and 10 under 35 U.S.C. § 103(a) as being unpatentable over CHUN-JEN in view TAKAHASHI, as applied to Claims 7 and 9 above, and in further view of LEE is in error, the rejection should be reversed, and the application should be remanded to the Examiner with instructions to allow dependent Claims 8 and 10.**

*In re Dependent Claim 8*

Appellant submits that dependent Claim 8 is allowable at least for the reason that it depends from allowable dependent Claim 7, which further depends from allowable dependent Claim 6 and allowable independent Claim 1, and because dependent Claim 8 recites additional features that further define the present invention.

Accordingly, Appellant respectfully requests that the decision by the Examiner to reject dependent Claim 8 under U.S.C. § 103(a) as being obvious over CHUN-JEN in view of TAKAHASHI, and further in view of LEE be reversed by the Board, and that the application be remanded to the Examiner with instructions to withdraw the rejection and to allow Claim 8.

*In re Dependent Claim 10*

Appellant submits that dependent Claim 10 is allowable at least for the reason that it depends from allowable dependent Claim 9, which further depends from allowable independent Claim 1, and because dependent Claim 10 recites additional features that further define the present invention.

Accordingly, Appellant respectfully requests that the decision by the Examiner to reject dependent Claim 10 under U.S.C. § 103(a) as being obvious over CHUN-JEN in view of TAKAHASHI, and further in view of LEE be reversed by the Board, and that the application be remanded to the Examiner with instructions to withdraw the rejection and to allow Claim 10.

**CONCLUSION**

In view of the foregoing, it is submitted that none of the references of record, when considered either alone or in any proper combination thereof, anticipate or render obvious the Appellant's invention as recited in Claims 1-21. The applied references of record have been discussed and distinguished, while significant claimed features of the present invention have been pointed out.

Appellant respectfully submits that each and every pending claim of the present invention meets the requirements for patentability under 35 U.S.C. §§ 112, 102 and 103, and requests that all of the aforementioned rejections be reversed by the Board, and the application be remanded to the Examiner with instructions to withdraw of all the rejections and to allow of all pending claims.

Accordingly, immediate allowance of the claims in the present application is respectfully requested and believed to be appropriate.

Respectfully submitted,

Date: 1/24/05 By:

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**CLAIMS APPENDIX**

1. (Previously Presented) A semiconductor package comprising:
  - a plurality of leads, each of the leads defining:
    - a generally planar first surface;
    - a generally planar second surface disposed in opposed relation to the first surface; and
    - a generally planar third surface disposed in opposed, substantially parallel relation to the second surface and laterally offset outwardly relative to the first surface;
  - a first semiconductor die defining opposed top and bottom surface;
  - a second semiconductor die defining opposed top and bottom surfaces;
  - a plurality of conductive connectors electrically and mechanically connecting the first semiconductor die to the first surfaces of the leads and the second semiconductor die to the second surfaces of the leads; and
  - an encapsulating portion applied to and at least partially encapsulating the leads, the first and second semiconductor dies, and the conductive connectors such that at least the first and second surfaces of each of the leads are covered by the encapsulating portion.
2. (Original) The semiconductor package of Claim 1 wherein the conductive connectors each comprise a conductive bump.
3. (Original) The semiconductor package of Claim 2 wherein the conductive bump is fabricated from material selected from the group consisting of:
  - gold; and
  - solder.
4. (Original) The semiconductor package of Claim 1 wherein:
  - the first semiconductor die includes a plurality of bond pads disposed on the top surface thereof;
  - the second semiconductor die includes a plurality of bond pads disposed on the bottom surface thereof; and

the conductive connectors are used to electrically and mechanically connect the bond pads of the first semiconductor die to respective ones of the first surfaces of the leads and the bond pads of the second semiconductor die to respective ones of the second surfaces of the leads.

5. (Original) The semiconductor package of Claim 4 wherein the conductive connectors each comprise a conductive bump.

6. (Original) The semiconductor package of Claim 1 wherein:

each of the leads includes a first bump land formed at a prescribed region of the first surface thereof and a second bump land formed at a prescribed region of the second surface thereof;

the conductive connectors each comprise a conductive bump; and

the conductive bumps are fused to respective ones of the first and second bump lands of each of the leads.

7. (Original) The semiconductor package of Claim 6 wherein each of the leads includes:

a first protective layer formed on at least a portion of the first surface thereof other than for the prescribed region including the first bump land; and

a second protective layer formed on at least a portion of the second surface thereof other than for the prescribed region including the second bump land.

8. (Original) The semiconductor package of Claim 7 wherein the protective layer is selected from the group consisting of:

a polyimide;

titanium;

aluminum; and

a solder resist.

9. (Original) The semiconductor package of Claim 1 wherein each of the leads includes:

a first protective layer coated on the first surface thereof about a respective one of the conductive connectors; and

a second protective layer coated on the second surface thereof about a respective one of the conductive connectors.

10. (Original) The semiconductor package of Claim 9 wherein the protective layer is selected from the group consisting of:

- a polyimide;
- titanium;
- aluminum; and
- a solder resist.

11. (Original) The semiconductor package of Claim 1 wherein the first and second semiconductor dies are identically sized.

12. (Original) The semiconductor package of Claim 1 wherein the encapsulating portion is applied to the leads such that the third surface of each of the leads is exposed within the encapsulating portion.

13. (Original) The semiconductor package of Claim 12 wherein the encapsulating portion is applied to the first and second semiconductor dies such that the bottom surface of the first semiconductor die and the top surface of the second semiconductor die are each exposed within the encapsulating portion.

14. (Previously Presented) The semiconductor package of Claim 13 wherein the leads and the first semiconductor die are oriented relative to each other such that the bottom surface of the first semiconductor die is substantially flush with the third surface of each of the leads.

15. (Previously Presented) The semiconductor package of Claim 1 wherein:

- each of the leads further defines an outer end which extends between the second and third surfaces thereof; and

- the encapsulating portion is applied to the leads such that the outer end of each of the leads is exposed within the encapsulating portion.

16. (Original) The semiconductor package of Claim 1 wherein each of the leads further defines a fourth surface disposed in opposed relation to the third surface and laterally offset outwardly relative to the second surface.

17. (Original) The semiconductor package of Claim 16 wherein the encapsulating portion is applied to the leads such that the third and fourth surfaces of each of the leads are exposed within the encapsulating portion.

18. (Original) The semiconductor package of Claim 17 wherein the encapsulating portion is applied to the first and second semiconductor dies such that the bottom surface of the first semiconductor die and the top surface of the second semiconductor die are each exposed within the encapsulating portion.

19. (Original) The semiconductor package of Claim 18 wherein the second semiconductor die and the leads are oriented relative to each other such that the top surface of the second semiconductor die is substantially flush with the fourth surface of each of the leads.

20. (Original) The semiconductor package of Claim 19 wherein the first semiconductor die and the leads are oriented relative to each other such that the bottom surface of the first semiconductor die is substantially flush with the third surface of each of the leads.

21. (Original) The semiconductor package of Claim 17 further in combination with a second semiconductor package identically configured to the semiconductor package, the third surfaces of the leads of the second semiconductor package being electrically connected to respective ones of the fourth surfaces of the leads of the semiconductor package.

22. (Cancelled)

23. (Cancelled)

24. (Cancelled)

25. (Cancelled)

26. (Cancelled)

27. (Cancelled)

28. (Cancelled)

29. (Cancelled)

30. (Cancelled)

31. (Cancelled)